

# Statement of Basis for Air Operating Permit—Final

**Linde Gas North America, Inc.**  
Anacortes, Washington

**July 29, 2015**



*Serving Island, Skagit & Whatcom Counties*

**PERMIT INFORMATION  
 LINDE GAS NORTH AMERICA, INC.  
 8579 South Texas Road, Anacortes, WA 98221**

**SIC: 2813**  
**NAICS: 325120**  
**EPA AFS: 53-057-01992**

**NWCAA ID: 1992-V-S**

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## **1 INTRODUCTION**

Linde Gas North America (from this point on in this document referred to as Linde, the facility, or the permittee) owns and operates a hydrogen gas production facility located at 8579 South Texas Road in Anacortes, WA. The steam methane reforming (SMR) hydrogen plant is located within the Shell Puget Sound Refinery (PSR). The Northwest Clean Air Agency (NWCAA) approved the construction of the SMR hydrogen plant under Order of Approval (OAC) 1104, issued on March 6, 2012. OAC 1104 was superseded by OAC 1104a on September 20, 2012 (details in Section 1.5.1). The SMR hydrogen plant commenced operation in March 2013. The Linde facility is a support facility to PSR and is therefore a major source required to obtain an Air Operating Permit (AOP or permit) pursuant to Title V of the 1990 Federal Clean Air Act (FCAA) and chapter 173-401 of the Washington Administrative Code (WAC). The NWCAA received Linde's complete Title V permit application on March 6, 2014.

The purpose of this Statement of Basis (SOB) is to set forth the legal and factual evidence for the conditions in Linde's AOP and to provide background information for permit review by interested parties. This Statement of Basis is not a legally enforceable document in accordance with WAC 173-401-700(8).

### **1.1 Facility Description**

Linde operations are located on land that is owned by the Shell Puget Sound Refinery. The Linde SMR hydrogen plant was built to provide hydrogen to the Shell Puget Sound Refinery. The hydrogen produced at Linde's hydrogen plant is purchased by the Shell Puget Sound Refinery. The purchased hydrogen is routed to a distribution header within the Shell Puget Sound Refinery. The refinery then distributes the hydrogen to its various refining processes as needed. The distribution of hydrogen produced at the Linde hydrogen facility is controlled by refinery personnel and daily operating requirements of the Shell Puget Sound Refinery.

A schematic diagram showing the PSR refinery and the position of the Linde hydrogen plant is shown in Figure 1-1 and an aerial photographs showing the facility is shown in Figure 1-2.

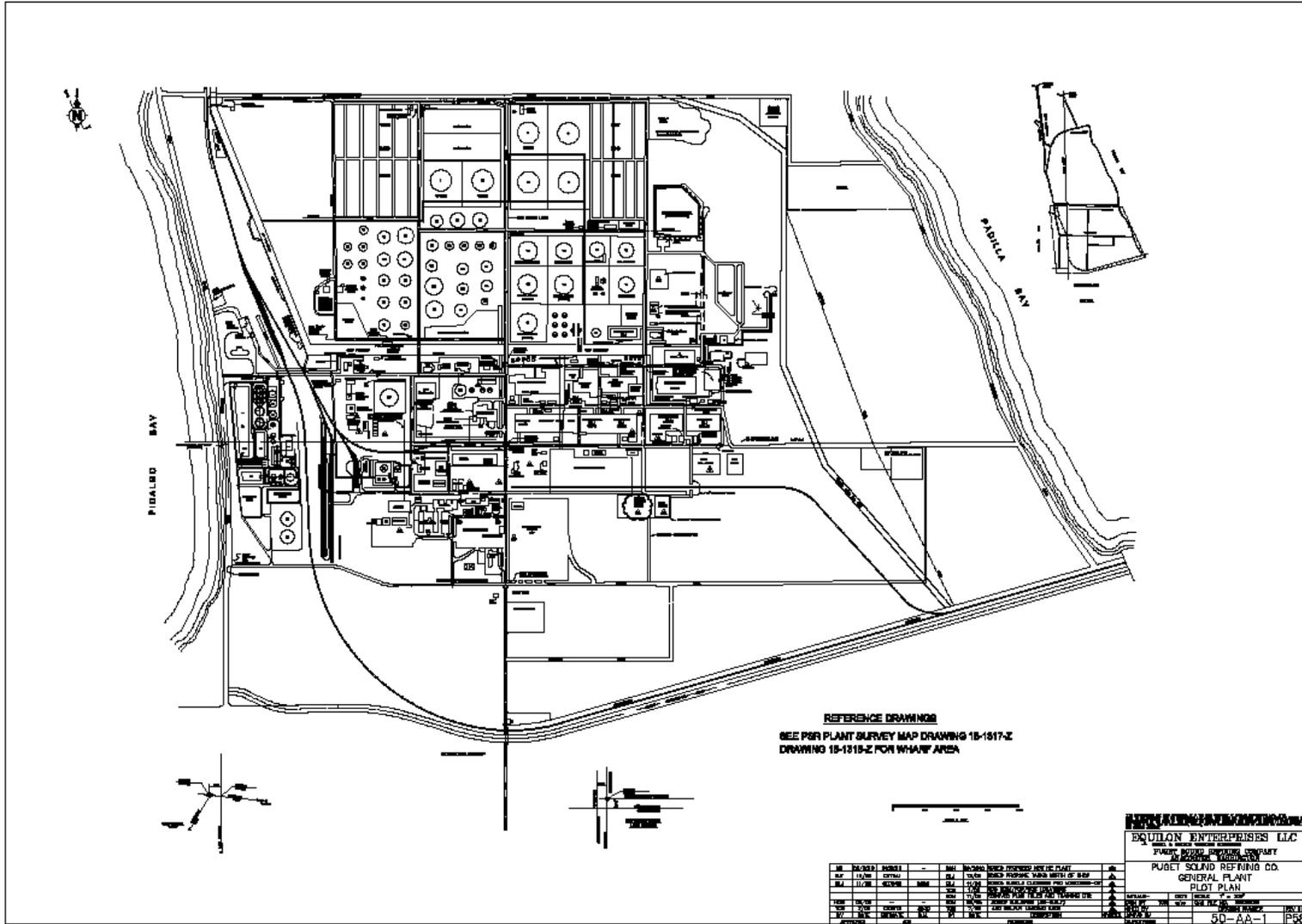


Figure 1-1 Schematic diagram showing the PSR refinery and the position of the Linde hydrogen plant.



**Figure 1-2 A view of the Linde facilities (position marked by blue dot), with the PSR refinery to the north (photo from google maps, accessed on 12/12/2014).**

## **1.2 Process Description**

Natural gas is supplied by pipeline to the Linde facility. Natural gas feed to the facility is split into two streams. In one stream, natural gas is sent to the SMR Process Heater to be used as trim fuel. In the other stream, the natural gas is desulfurized and then sent to the reformer as process feed. The gas must be desulfurized since sulfur acts as poison to the catalysts in the reformer. In the reformer and shift converter reactors, the desulfurized gas is mixed with saturated steam and reacts in the presence of catalysts to form hydrogen and carbon dioxide, along with some byproducts, such as carbon monoxide. The reactions in the reformer are endothermic, while those in the shift conversion unit are exothermic. The process gas that exits the shift converter is cooled and sent to the Pressure Swing Adsorption (PSA) system. The PSA system purifies the hydrogen product. The offgas from the PSA system is recycled back into the system to be used as primary fuel for the SMR

Process Heater. The purified hydrogen product is compressed and piped to the PSR. A simplified process flow diagram for the site is shown in Figure 1-3.

Heat for the entire process is provided by burning natural gas (as trim fuel) and PSA offgas in the SMR Process Heater located at the bottom of the reformer furnace. Throughout the process, waste heat is recovered. The facility generates steam on-site. The majority of the generated steam is mixed with the natural gas feed and is used in the steam methane reforming reaction to generate hydrogen. A second stream is exported to the refinery, and a small amount of this stream is let down to low pressure and used in the deaerator to strip oxygen from the boiler feed water.

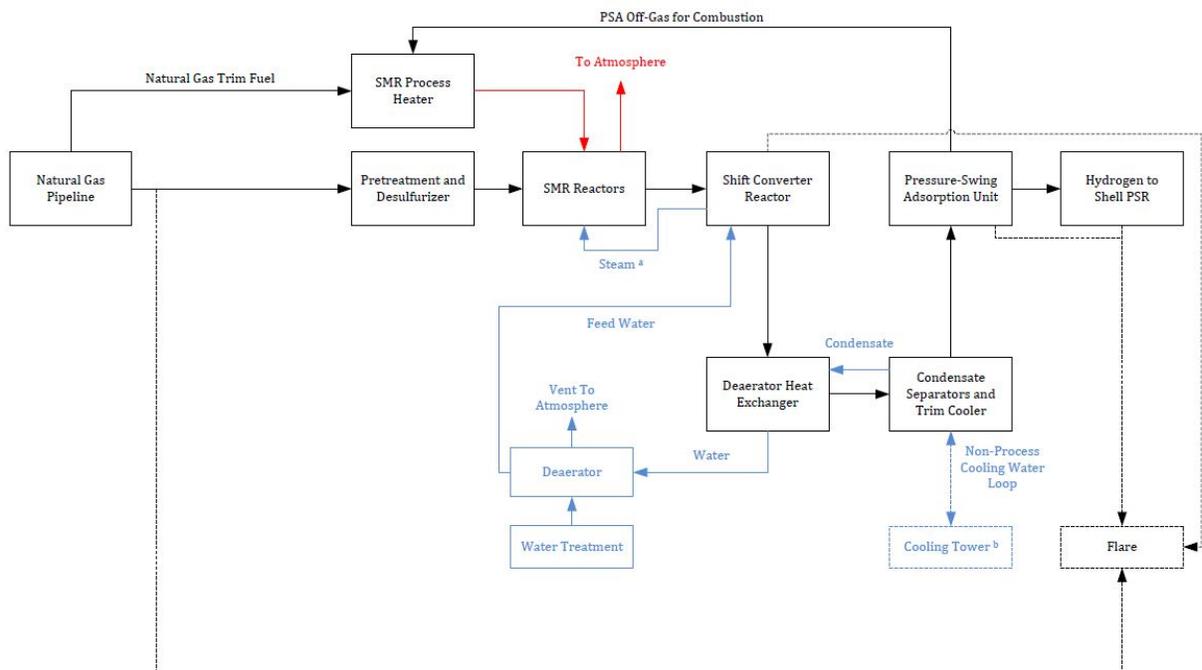


Figure 1-3 Linde process diagram

### 1.3 Emission Units and Control

The primary emission source at the facility is the SMR Process Heater. The SMR Process Heater consists of six burners, each rated at 10.42 MMBtu/hr with an aggregate heat capacity of 69.8 MMBtu/hr based on the higher heating value (HHV) of the fuels (62.5 MMBtu/hr based on the lower heating value (LHV) of the fuels). These burners combust a mixture of natural gas and PSA offgas as fuel. The hot flue gases from the SMR Process Heater pass through the reformer unit, supplying heat to the process. Heat is recovered from these gases, then the cooled gases are discharged to atmosphere via the reformer flue gas stack.

The Linde facility is equipped with a flare. During events of startup/shutdown and emergencies, the flare can be used to combust process gases in the system prior to venting to the atmosphere.

The deaerator and cooling tower are other emission sources at the facility. The deaerator removes dissolved gases in the boiler feed water so as to prevent corrosion problems downstream. Emissions from the deaerator are released to the atmosphere through a vent.

The facility also includes a cooling tower that releases particulate emissions, both coarse and fine.

Equipment components in a facility are susceptible to leaks, causing small amounts of fugitive emission releases into the atmosphere. The equipment components at the Linde facility service only gaseous material, particularly the various process gases such as natural gas, syngas and offgas. Small amounts of fugitive volatile organic compound (VOC) emissions are expected from these equipment component leaks.

Primary emission sources at the facility are listed in Table 1-1. There are also insignificant emission units at the facility that are exempt according to WAC 173-401-532.

**Table 1-1 Emission Unit Identification**

Emission Unit Identification	Construction/Modification Year	Control Device	Process Description
SMR Unit	2013	None	Feed to the Steam Methane Reformer (SMR) consists of desulfurized recycled hydrogen and natural gas, mixed with steam. In the reformer, methane catalytically reacts with steam at high temperature to produce syngas, a mixture of carbon monoxide (CO) and hydrogen. Another catalytic reaction, called "shift conversion" reacts the CO with steam to form hydrogen and carbon dioxide (CO <sub>2</sub> ). After cooling, this gas mixture is purified by removing CO <sub>2</sub> in the Pressure Swing Absorption (PSA) unit, producing high-purity hydrogen. The remaining CO and CO <sub>2</sub> (called PSA offgas) is recycled back as fuel (along with supplemental natural gas) to the SMR furnace.
Flare	2013	None	Process gases are routed to the flare for combustion during SMR unit startups, shutdowns, maintenance events, and in the event of an emergency.
Deaerator	2013	None	Removes dissolved gases in the boiler feed water so as to prevent corrosion problems downstream.

#### 1.4 Emissions Inventory

Linde submitted an emissions inventory with their application, including their potential to emit. The calculation methodologies are included with the Linde's application. The summary of potential emissions is shown in Table 1-2. Table 1-3 shows the actual emissions from 2013.

**Table 1-2 Summary of Potential Emissions**

Emission Unit	PM (tpy)	PM10 (tpy)	PM2.5 (tpy)	SO2 (tpy)	NOx (tpy)	VOC (tpy)	CO (tpy)	HAP (tpy)
SMR	1.53	1.53	1.53	0.88	12.23	1.22	12.23	0.57
Flare	0.33	0.33	0.33	0.13	2.60	0.24	22.36	0.08
Deaerator	-	-	-	-	-	0.93	0.17	0.93
Cooling Tower	0.16	0.13	0.00	-	-	-	-	-
Fugitive leaks	-	-	-	-	-	0.74	1.22	-
<b>Total</b>	<b>2.02</b>	<b>1.99</b>	<b>1.86</b>	<b>1.01</b>	<b>14.83</b>	<b>3.13</b>	<b>35.99</b>	<b>1.58</b>
<b>Facility-wide greenhouse gas emissions in CO<sub>2e</sub> metric tons per year: 64,300</b>								

**Table 1-3 2013 Emissions Inventory**

Emission Unit	PM (tpy)	PM10 (tpy)	PM2.5 (tpy)	SO2 (tpy)	NOx (tpy)	VOC (tpy)	CO (tpy)	HAP (tpy)
SMR	0.98	0.98	0.98	0.57	8.46	0.79	7.87	0.36
Flare	0.15	0.15	0.15	0.05	1.14	0.09	8.19	0.03
Deaerator	-	-	-	-	-	0.71	0.13	0.71
Cooling Tower	0.12	0.10	2.23E-03	-	-	-	-	-
Fugitive leaks	-	-	-	-	-	0.61	1.01	-
<b>Total</b>	<b>1.25</b>	<b>1.23</b>	<b>1.13</b>	<b>0.62</b>	<b>9.6</b>	<b>2.20</b>	<b>17.19</b>	<b>1.11</b>
<b>Facility-wide greenhouse gas emissions in CO<sub>2e</sub> metric tons per year: 41,885</b>								

## 1.5 Permitting History

### 1.5.1 Northwest Clean Air Agency Orders of Approval to Construct

#### 1.5.1.1 OAC 1104

Linde received OAC 1104 from the NWCAA on 03/06/2012. The order was issued for a new hydrogen plant to supply hydrogen gas to the adjacent Shell Puget Sound Refinery. The plant has a maximum nominal design capacity of 7.15 million standard cubic feet per day

(MMSCFD). The SMR Process Heater has a maximum rated heat input capacity of 69.8 million Btu per hour (MMBtu/hour) (based on the higher heating value (HHV) of the fuel), and an elevated flare used to combust off specification gasses during startup, shutdown and upset conditions. The SMR Process Heater is equipped with ultra-low nitrogen oxide burners (ULNB) with a NOx performance rating of 0.04 lb/MMBtu.

OAC 1104 has been rescinded on 9/20/2012.

#### **1.5.1.2 OAC 1104a**

On 09/20/2012 NWCAA issued OAC 1104a, revising the previous OAC, to establish a specific GHG mitigation method.

On December 15, 2011, pursuant to Chapter 43.21C RCW, Chapter 197-11 WAC, and Chapter 14.12 of the Skagit County Code, Skagit County issued a Mitigated Determination of Non-significance (MDNS) for the Linde hydrogen plant. The terms enumerated in the MDNS include the greenhouse gas mitigation measure set forth below as Condition 13 of OAC 1104a. Conditions 13, 14 and 15 of OAC 1104a were incorporated as conditions of approval pursuant to RCW 43.21C.060, and Sections 155.8 and 155.13 of the NWCAA Regulation. These conditions are enforceable under subsection G of 155.8 NWCAA Regulation and under the procedures of Section 100 of NWCCA Regulation. These conditions are not new source review approval condition under Section 300 of the NWCAA Regulation, RCW 70.94.152, the federal Clean Air Act, or the Washington State Implementation Plan.

Conditions 13, 14, and 15 are listed below:

13. *In accordance with Washington State Department of Ecology's Guidance for Ecology Including Greenhouse Gas Emissions in SEPA Reviews, dated June 3, 2011, Linde shall mitigate 198,158 metric tons of greenhouse gas emissions as carbon dioxide equivalents (60,048 metric tons CO<sub>2</sub>e/year project increase x 11 % mitigation x 30 year project lifecycle). The mitigation strategy shall be enforceable through an order issued by the Northwest Clean Air Agency that specifies the method for mitigation and associated monitoring, recordkeeping and/or reporting to ensure that the mitigation action is documented. This order shall be issued by the Northwest Clean Air Agency prior to startup of the new hydrogen plant.*
14. *In satisfaction of Condition 13 of this Order, within six months of the startup date of the new SMR Process Heater, payment in full shall be made to the NWCAA of \$317,053 for deposit into the NWCAA greenhouse gas mitigation fund. This payment amount is based on the greenhouse gas emissions required to be mitigated multiplied by \$1.60 per metric ton of carbon dioxide equivalents (198,158 metric tons x \$1.60).*
15. *If the Linde SMR is permanently shutdown in less than 30 years, the amount of mitigated CO<sub>2</sub>e for the remaining time period shall be credited to the Puget Sound Refinery for use in other projects solely within the refinery. The amount of remaining mitigation credits shall be calculated as the years remaining divided by 30, multiplied by 198,158 metric tons CO<sub>2</sub>e. The remaining potential to emit increase for any project within the refinery for which these credits can be used shall be calculated as the years remaining multiplied by 60,048 metric tons CO<sub>2</sub>e. The mitigation credits are valid for a 5-year period from the date of shutdown of the Linde SMR and cannot be sold or transferred to other facilities. This paragraph refers to mitigated CO<sub>2</sub>e emissions referenced in conditions 13 and 14 of this order as required mitigation under Washington State Environmental Policy, Chapter 43.21C RCW, and any mitigation*

*credits used in the future shall be allocated consistent with similar regulations in place at that time.*

Initial testing to satisfy requirements of OAC 1104/1104a was performed on 7/12/2013. CO was measured to be 0.0 lb/hr (permit limit 2.8 lb/hr), and NO<sub>x</sub> was measured to be 2.4 lb/hr (permit limit 2.8 lb/hr) and 32 ppmvd at 0% O<sub>2</sub> (permit limit 60 ppmvd at 0% O<sub>2</sub>).

OAC 1104a has been rescinded on 6/4/2015.

#### **1.5.1.3 OAC 1104b**

On 5/26/2015 NWCAA issued OAC 1104b, revising the previous OAC, to define startup/shutdown, and establish NO<sub>x</sub> limits that apply only during startup and shutdown. Also, the NO<sub>x</sub> compliance method has been changed to one that is CEMS-based. CO testing frequency has been reduced to once per five years. During the two stack tests to-date, the measured CO emission rate was 0.0 lb/hr.

### **1.5.1 Compliance Reports**

The Linde AOP requires periodic, semiannual, and annual reports to be submitted to the NWCAA as part of the facility's ongoing compliance demonstration. When a permit deviation occurs, the facility is required to submit a periodic report within 30 days after the end of the month during which the deviation occurred identifying any excess emissions and provide a discussion as to the cause and what was done to correct the problem. The facility submits a semiannual summary report of emissions, process information, and continuous monitoring system performance. In addition, semiannual reports are submitted providing for the certification by the responsible corporate official of the truth, accuracy, and completeness of reports submitted during the previous six-month period. Annually, the responsible corporate official also certifies compliance with all applicable requirements in the AOP term by term and whether the facility was fully or intermittently in compliance with each term.

## **1.6 Compliance History**

### **1.6.1 NOV 4083, issued on 4/15/2014**

Linde was operating an O<sub>2</sub> monitoring system (as a NO<sub>x</sub> surrogate monitor) under NSPS Subpart Ja that is not meeting the quality assurance (QA) procedures in subpart Ja. Specifically, the daily calibration drift tests and quarterly audit requirements were not being met.

Linde self-reported the issue in a letter received by NWCAA on 1/30/14. The monitoring QA shortfall was found by the contractor preparing the Title 5 permit application and reported to NWCAA in a letter received by the agency on 1/30/14. The facility was using the combustion oxygen monitoring and control system as the oxygen monitoring device. The facility was hesitant to implement the QA procedures on this system since it essentially ran the furnace – gauging the risk of tripping the unit as too high. The monitor is accurate and stable – it was simply a logistical issue. The monitor data indicated that the facility was in compliance with the NO<sub>x</sub> limit.

### **1.6.2 Compliance Order 12, effective date 8/28/2014**

In their response to NOV 4083, Linde stated that they would install a NO<sub>x</sub> continuous emissions monitoring system in order to satisfy requirements in NSPS Subpart Ja. Compliance Order 12 was issued by NWCAA with an effective date of 8/28/2014. This compliance order stipulated, among other things, that Linde is subject to Title V and that they would install the NO<sub>x</sub> CEMS to satisfy requirements in NSPS Subpart Ja.

Compliance Order 12 constitutes a final settlement for NOV 4083, addressing and providing resolution to the non-compliance allegations in NOV 4083. A copy of Compliance Order 12 is included in Appendix A.

## **2 BASIS OF REGULATION APPLICABILITY**

### **2.1 Washington Administrative Code**

The Washington Administrative Code (WAC) primarily contains requirements that apply generally to all air pollution sources. These generally applicable requirements, such as limits on visible emissions (opacity), SO<sub>2</sub>, and fugitive particulate matter are addressed in Section 4 of the air operating permit.

### **2.2 NWCAA Regulation**

The NWCAA Regulation primarily contains requirements that are generally applicable to all air pollution sources. These requirements and their generic limits are addressed broadly in Section 4 of the AOP.

The requirements in NWCAA Section 580 apply specifically to various petroleum refinery processes (storage vessels, equipment leaks, turnarounds and vacuum systems, and loading racks). Sections 580.25-580.10 are not applicable to Linde because Linde does not own or operate sources that belong to those categories addressed in the corresponding section.

The NWCAA NSR regulations reflect state and federal NSR regulations. The federal system to implement the Clean Air Act (in particular programs related to the NAAQS) may be administered by the federal government or it may be delegated (in part) to states, such as Washington, that seek regulation through State Implementation Plans (SIP). Certain state and local (NWCAA) regulations are part of the Washington State Implementation Plan and are therefore enforceable by both the EPA and the NWCAA. These SIP-approved rules are included in the AOP. There can be a lag between a change to a state/local regulation and approval into the SIP. Note that there may be both a SIP-approved version of a regulation and a non-SIP approved version (identified as “state only”) in the AOP.

The NWCAA does not currently have authority to issue PSD permits. The NWCAA has authority to enforce local, state and most federal regulations and to fully enforce the AOP.

### **2.3 New Source Performance Standards (NSPS)**

#### **2.3.1 40 CFR 60 Subpart Db (Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units)**

Linde does not own or operate a source that belongs to this source category. Combustion in the natural gas/PSA offgas burners associated with the SMR reactor has a maximum heat input capacity of 69.8 MMBtu/hr HHV, below the applicability threshold for NSPS Subpart Db.

#### **2.3.2 40 CFR 60 Subpart Dc (Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units)**

Linde operates natural gas/PSA offgas burners associated with the SMR reactor. These burners meet the definition of process heaters in 40 CFR 60 Subpart Dc (NSPS Subpart Dc). The PSA offgas burners are used primarily for driving the reformer reaction, so they qualify as a process heater and not as a steam generating unit. Any steam generated from latent heat in the waste gas from the SMR reformer is incidental to the primary operation of the reformer. Therefore, Linde is not subject to NSPS Subpart Dc. Note that this is consistent with a similar EPA determination<sup>1</sup>.

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<sup>1</sup> <http://cfpub.epa.gov/adi/pdf/adi-nsps-9900003.pdf>, accessed on 9.18.2012

### **2.3.3 40 CFR 60 Subpart J (Standards of Performance for petroleum refineries)**

Subpart J applies to fuel gas combustion devices at petroleum refineries. The SMR process heater at the Linde facility combusts fuel gases. Per 40 CFR 60.100(b), new fuel gas combustion devices that are not flares are not subject to Subpart J if they are constructed after May 14, 2007. According to the Subpart Ja definition of a "fuel gas combustion device," a flare that combusts fuel gases is a fuel gas combustion device. Per 40 CFR 60.100(b), new fuel gas combustion devices that are also flares are not subject to Subpart J if they are constructed after June 24, 2008.

Based on the 2013 construction date of the Linde facility, Subpart J does not apply.

### **2.3.4 40 CFR 60 Subpart Ja (Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After May 14, 2007)**

40 CFR 60 Subpart Ja (NSPS Subpart Ja) applies to fluid catalytic cracking unit catalyst regenerators, fuel gas combustion devices, and Claus sulfur recovery plants of a certain size that are constructed, reconstructed, or modified after May 14, 2007. Linde operates a forced draft SMR process heater and a flare, both constructed in 2013, which is after the applicability dates in Subpart Ja. As such, NSPS Subpart Ja applies to Linde.

### **2.3.5 40 CFR 60 Subpart GGG (Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for which Construction, Reconstruction, or Modification Commenced After January 4, 1983, and on or Before November 7, 2006)**

40 CFR 60 Subpart GGG (NSPS Subpart GGG) applies to equipment leaks of VOC at petroleum refineries that commenced construction after January 4, 1983 and before November 7, 2006. All of Linde's equipment was constructed in 2013, which is after November 7, 2006. Therefore, Subpart GGG does not apply to any equipment at the Linde site.

### **2.3.6 40 CFR 60 Subpart GGGa (Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006)**

40 CFR 60 Subpart GGGa (NSPS Subpart GGGa) applies to equipment leaks of VOC at petroleum refineries where streams contain at least 10% by weight VOC. Components at the Linde plant will be handling gasses comprised of primarily methane, carbon monoxide, carbon dioxide and hydrogen. These compounds are not VOCs. The process equipment handled gaseous and light liquids at the Linde plant are below the 10% by weight VOC threshold, and therefore not applicable under Subpart GGGa.

### **2.3.7 40 CFR 60 Subpart QQQ (Standards of Performance for VOC Emissions From Petroleum Refinery Wastewater Systems)**

40 CFR 60 Subpart QQQ (NSPS Subpart QQQ) applies to individual drain systems along with other portions of the oily wastewater collection system at petroleum refineries. Oily wastewater means "wastewater generated during the refinery process which contains oil, emulsified oil, or other hydrocarbons. Oily wastewater originates from a variety of refinery processes including cooling water, condensed stripping steam, tank draw-off, and contact process water". Linde routes its wastewater to PSR for treatment in the refinery Effluent Plant. It is unlikely that any water at Linde would contact any organics or oil during normal operations since the only organics that Linde handles is natural gas as a raw material. As

such, the drains at Linde would not be considered process drains and is not subject to NSPS Subpart QQQ.

## **2.4 40 CFR 61 National Emission Standards for Hazardous Air Pollutants (NESHAP)**

National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR 61 apply to specific operations that handle certain hazardous air pollutants (HAP). Generally, several NESHAP rules potentially apply to petroleum refineries based on the materials they handle; however, only one, 40 CFR 61 Subpart FF, applies specifically to petroleum refineries. 40 CFR 61 Subpart FF (National Emission Standard for Benzene Waste Operations) applies to petroleum refineries that treat, store, or dispose of benzene-containing waste.

Linde does not handle any process material that contains benzene, and as such, Linde is not subject to 40 CFR 61 Subpart FF.

## **2.5 National Emission Standards for Hazardous Air Pollutants (NESHAP)**

NESHAP under 40 CFR 63 applies facility-wide to specific industries that are major sources of HAP. Generally, the construction date of equipment does not play into specific applicability; it just determines whether the equipment is considered “existing” or “new” equipment, which dictates the standards to which it is subject. The three Part 63 NESHAPs that are most likely to apply to Linde are Subparts CC, UUU, and DDDDD. Applicability is discussed below.

### **2.5.1 40 CFR 63 Subpart CC (National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries)**

40 CFR 63 Subpart CC applies to “petroleum refining process units” that are located at a major source and that contain or contact any of the HAPs listed in Table 1 of the rule. “Petroleum refining process unit” means a process unit used in an establishment primarily engaged in petroleum refining that produces transportation fuels (such as gasoline, diesel fuels, and jet fuels), heating fuels (such as kerosene, fuel gas distillate, and fuel oils), or lubricants; separates petroleum; or separates, cracks, reacts, or reforms intermediate petroleum streams.

Miscellaneous process vents (MPV) are defined as gas streams that are “continuously or periodically discharged during normal operation.” Linde vents process gases to the flare during startup/shutdown and malfunction scenarios only. Subpart CC specifies that these conditions do not constitute continuous or periodic discharge (40 CFR 63.641). As such, the vents to the flare do not meet the definition of miscellaneous process vents in Subpart CC.

Under the definition of miscellaneous process vents, a list of vents is included that are excluded from being considered MPV. One item on the list is: “Hydrogen production plant vents through which carbon dioxide is removed from process streams or through which steam condensate produced or treated within the hydrogen plant is degassed or deaerated.” The deaerator at Linde was installed to remove dissolved gases in the boiler feed water, and is therefore categorically exempt from the definition of MPV.

Wastewater is defined in 40 CFR 63 Subpart CC as “water or wastewater that, during production or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product and is discharged into any individual drain system. Examples are feed tank drawdown; water formed during a chemical reaction or used as a reactant; water used to wash impurities from organic products or reactants; water used to cool or quench organic vapor streams through direct contact; and condensed steam from jet ejector systems

pulling vacuum on vessels containing organics.” As discussed above under NSPS Subpart QQQ, Linde routes its wastewater to PSR for treatment in the PSR Effluent Plant. However, it is unlikely that any water at Linde would contact any organics during normal operation. The only organics that Linde may potentially handle is natural gas as a raw material. As such, Linde’s wastewater system is not subject to 40 CFR 63 Subpart CC requirements.

**Equipment Leaks:** Equipment leaks is defined in 40 CFR 63 Subpart CC as emissions of organic hazardous air pollutants from a pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, or instrumentation system “in organic hazardous air pollutant service” as defined in the rule. “In organic hazardous air pollutant service” means that a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 5 percent by weight of total organic HAPs. The original NOC application from Linde (OAC 1044) estimated VOC and HAP emissions from fugitives to be 0.74 tpy and 0.00 tpy respectively. The equipment components at the Linde facility service only gaseous material, particularly natural gas, PSA offgas or syngas. The VOC content of the natural gas to be used at the Linde facility is estimated at 1.67%, (figure used by Linde in the OAC application for the facility). Due to their low VOC content, none of the streams within Linde are likely to contain at least 5% HAP. As such, Linde’s equipment leaks are not subject to 40 CFR 63 Subpart CC requirements.

**Storage vessels:** Linde does not have any storage vessels that are subject to 40 CFR 63 Subpart CC requirements.

Linde is not subject to 40 CFR 63 Subpart CC requirements.

#### **2.5.2 40 CFR 63 Subpart UUU (National Emission Standards for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units)**

Linde does not operate any catalytic cracking units, catalytic reforming units, or sulfur recovery units. As such, Linde is not subject to 40 CFR 63 Subpart UUU.

#### **2.5.3 40 CFR 63 Subpart DDDDD (National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters)**

Linde is subject to 40 CFR 63 Subpart DDDDDD, also known as the boiler MACT. According to §63.7485, one is subject to 40 CFR 63 Subpart DDDDDD if one owns or operates an industrial, commercial, or institutional boiler or process heater as defined in §63.7575 that is located at, or is part of, a major source of HAP as defined in §63.2 or §63.761. Linde is part of a major source of HAP, the PSR refinery. As such, Linde is subject to the boiler MACT.

### **2.6 Compliance Assurance Monitoring (CAM)**

The requirements of Compliance Assurance Monitoring are contained in 40 CFR 64. They apply to a pollutant-specific emissions unit at a major source that is required to obtain a part 70 or 71 permit provided the unit satisfies all criteria as delineated in 40 CFR 64.2(a)(1)-(3). In particular, 40 CFR 64.2(a)(2) stipulates that the emission unit uses a control device to achieve compliance. Linde does not use any control devices, as these are defined in 40 CFR 64.1, to achieve compliance. The flare emission unit is not used as a control device for other emission units; rather, it is process equipment restricted to flaring process gases such as off-spec hydrogen gas. Therefore, Linde is not subject to the CAM rule.

## 2.7 Chemical Accident Prevention Provisions

The goal of 40 CFR 68 and the risk management program it requires is to prevent accidental releases of substances that can cause serious harm to the public and the environment from short-term exposures and to mitigate the severity of releases that do occur. If a tank, drum, container, pipe, or other process at a facility contains any of the extremely hazardous toxic and flammable substances listed in Table 1 to 40 CFR 68.130 in an amount above the “threshold quantity” specified for that substance, the facility operator is required to develop and implement a risk management program.

## 2.8 New Source Review (NSR)

### 2.8.1 Basic Information

New Source Review requires stationary sources of air pollution to acquire permits before they begin construction. NSR is also referred to as construction permitting or preconstruction permitting.

There are three types of NSR permits. A source may have to acquire one or more of these permits:

- Prevention of Significant Deterioration (PSD) permits, which are required for new major sources or a major source making a major modification in an attainment<sup>2</sup> area;
- Nonattainment NSR permits, which are required for new major sources or major sources making a major modification in a nonattainment area; and
- Minor source permits, which are required for sources that emit pollutants below the major source threshold but above the minor source threshold. It is generally the case that a major new or modified source will also require minor NSR permitting that covers a different subset of pollutants.

Nonattainment NSR permits are only required if a source is located in an area classified as being nonattainment for one or more of the National Ambient Air Quality Standards (NAAQS). The area where Linde is located is currently in attainment for all NAAQS. Hence, a nonattainment NSR permit is not expected to be needed unless the area is re-designated.

### 2.8.2 What are Permits?

Permits are legal documents that the source must follow. Permits specify what emission limits must not be exceeded and how the source is to demonstrate compliance with the set limits. Permits may contain conditions to ensure that the source is built according to the permit application upon which the permitting agency relies for air impact analysis. For example, the permit may specify a stack height that was used by the permitting agency to determine compliance with air pollutant limits. Some limits in the permit may be specified at the request of the source to keep them from being subject to other requirements. For example, the source may take limits in a minor NSR permit to keep the source out of PSD. To assure that sources follow permit requirements, permits also contain monitoring, recordkeeping, and reporting (MR&R) requirements.

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<sup>2</sup> An attainment area means a geographic area designated by EPA at 40 CFR 81 as having attained the National Ambient Air Quality Standard for a given criteria pollutant (Reference: WAC 173-400-030 (9)).

### **2.8.3 Who Issues the Permits?**

In Washington State most NSR permits are issued by the Washington State Department of Ecology (“Ecology”) or local air pollution control agencies. The EPA issues the permit in some cases. Ecology and local air pollution control agencies have their own permit programs that are approved by EPA in the State Implementation Plan (SIP). In general, in the NWCAA jurisdiction, which encompasses Island, Skagit, and Whatcom Counties, Ecology issues major NSR permits (PSD permits) and NWCAA issues minor NSR permits (Orders of Approval to Construct, or OACs).

### **2.8.4 Prevention of Significant Deterioration**

Before a major source can be constructed or modified in an area that meets all the health-based ambient air requirements (i.e. in an attainment area), the owner or operator must demonstrate that the project will not cause or contribute to violations of any ambient air quality standard or air quality increment. Also, the owner or operator must demonstrate that the project will not cause significant deterioration in nearby Class I Areas (parks and wilderness areas).

Linde doesn’t currently have any PSD permits.

### **2.8.5 Minor NSR**

New or modified sources of air pollution are required to obtain a permit from the NWCAA before beginning construction. Permits are referred to as Orders of Approval to Construct (OACs) and contain a wide range of local, state, and federal requirements to minimize air pollution impacts on the environment. The type of activity, the size of the operation, and the kinds of pollutants emitted determine permit conditions.

Linde currently has one OAC, OAC 1104a, which approved construction of the SMR furnace.

## **2.9 Greenhouse Gases (GHG) Regulations**

### **2.9.1 40 CFR 98, Federal Mandatory Greenhouse Gas Emission Inventory Regulation**

The requirements for the mandatory greenhouse gas reporting are contained in 40 CFR 98. This regulation is implemented in its entirety by the EPA. This regulation is excluded from appearing in a Title V air operating permit because it does not contain applicable requirements under the Title V program (WAC 173-401-200(4)).

The following discussion is included here for completeness. In order for a facility to be subject to 40 CFR 98, it must meet the requirements of 1, 2, or 3 below:

1. A facility that contains any source category that is listed in Table A–3 of 40 CFR 98 Subpart A.
2. A facility that contains any source category that is listed in Table A–4 of 40 CFR 98 Subpart A that emits 25,000 metric tons CO<sub>2</sub>e or more per year in combined emissions from stationary fuel combustion units.
3. A facility that has stationary fuel combustion units with an aggregate maximum rated heat input of 30 MMBtu/hr or greater, and the facility emits 25,000 metric tons CO<sub>2</sub>e or more per year in combined emissions from all stationary fuel combustion sources.

Subpart P of 40 CFR 98 establishes reporting requirements for hydrogen production. This source category consists of process units that produce hydrogen by reforming, gasification,

oxidation, reaction, or other transformation of feedstock, and that sell the hydrogen as a product. Hydrogen production units that are located at a petroleum refinery are included in this source category if they are not owned by or under the direct control of the refinery owner. Hydrogen production units that are owned by a petroleum refinery must report under subpart Y (Petroleum Refineries).

The Linde GHG PTE calculation is based on a maximum potential throughput of natural gas (including process gas and fuel) at the facility of 135,475 scf per hour, as established in Condition 1 of the facility's OAC 1104a. An annual operation time of 8,760 hours per year is assumed for the purpose of calculating potential emissions, which result in 64,300 metric tons of CO<sub>2e</sub>. Actual emissions, determined based on the site's records of natural gas throughput for 2013 were reported by Linde as 41,885 metric tons of CO<sub>2e</sub>.

## **2.9.2 WAC 173-441, Washington State Reporting of Emissions of GHG**

Chapter 173-441 WAC, "Reporting of Emissions of Greenhouse Gases", is a mandatory greenhouse gas (GHG) reporting rule for:

- Suppliers that supply applicable fuels sold in Washington State of which the complete combustion or oxidation would result in at least 10,000 metric tons of carbon dioxide annually; or
- Any listed facility that emits at least 10,000 metric tons of CO<sub>2</sub>-equivalents (CO<sub>2e</sub>) of greenhouse gases annually in the state.

WAC 173-441 was adopted by Ecology on December 1, 2010 and became effective on January 1, 2011. This regulation applies to the facility because the facility emits at least 10,000 metric tons of CO<sub>2e</sub> of greenhouse gases per year. Similar to the federal reporting rule (40 CFR 98, see discussion in Section 2.9.1), WAC 173-441 requires annual GHG inventories with reports due no later than March 31 of the following year for facilities that are also subject to 40 CFR 98. Under WAC 173-441, annual emissions shall be reported to Ecology beginning in calendar year 2012. This regulation is implemented in its entirety by Ecology and is considered an applicable requirement under the Title V program; as such, it is included in Section 2 of the AOP for the facility.

### **3 GENERAL PERMIT ASSUMPTIONS**

#### **3.1 Permit Content**

The permit contains (1) standard terms; (2) generally applicable conditions for the type of facility permitted; and (3) specifically applicable conditions originating from PSD permits, approvals to construct and any orders referencing the facility. Applicable requirements that were satisfied by a single past action on the part of the source are not included in the permit but are discussed in the Statement of Basis. An example would include performance testing to demonstrate compliance with applicable emission limitations as a requirement of initial startup. Regulations that require action by a regulatory agency, but not of the regulated source, are not included as applicable permit conditions.

#### **3.2 One Time Requirements**

##### **3.2.1 Initial notification of applicability of 40 CFR Subpart DDDDD**

On 5/31/2013 NWCAA received a letter from Linde serving as the initial notification that the SMR unit is subject to the requirements of 40 CFR 63 Subpart DDDDD as stated in 63.7495(d).

##### **3.2.2 OAC 1104a Condition 12**

Linde, with a letter dated 03/19/2013, reported the initial firing of the SMR heater in satisfaction of OAC 1104a, Condition 12.

##### **3.2.3 OAC 1104a Conditions 13 and 14.**

A payment of \$317,053.00 was received on 12/13/2012 from Linde as a fulfillment of Conditions 13 and 14 of OAC 1104a (see Section 1.5.1.2).

##### **3.2.4 Compliance Order 12**

Compliance Order 12 required that Linde take the following 3 actions:

- A. On or before July 22, 2014, Linde shall submit a modification application regarding the clarification of startup and shutdown and testing requirements in OAC 1104 with the required modification fees.
- B. On or before September 30, 2014, Linde shall install and certify a CEMS meeting the requirements of 40 CFR Part 60 Subpart Ja for NO<sub>x</sub> monitoring.
- C. Upon demonstration of compliance with 40 CFR Part 60 Subpart Ja monitoring requirements, Linde shall provide a written notification to NWCAA.

On 8/1/2014, Linde submitted an application to clarify the SSM provisions of OAC 1104. This satisfied Compliance Order 12 action item A.

On 10/1/2014, Toby Mahar of NWCAA received via email a letter stating that Linde has installed and is operating a CEMS for NO<sub>x</sub>. The CEMS was certified on 9/4/2014 by Rob Wilson of ETI following the successful completion of the Relative Accuracy Test Audit and Seven Day Drift Test. The test report was submitted electronically to NWCAA on September 18, 2014 and a hard copy was mailed on October 1, 2014. The letter served as written notification to NWCAA that Linde is in compliance with the monitoring requirements of 40 CFR Part 60 Subpart Ja, and the terms of Compliance Order 12.

### **3.3 Federal Enforceability**

Federally enforceable requirements are terms and conditions required under the Federal Clean Air Act or under any of its applicable requirements such as part 63 of Title 40 (the NESHAP program). Local and state regulations may become federally enforceable by formal approval and incorporation into the State Implementation Plan (SIP) or through other delegation mechanisms. Federally enforceable requirements are enforceable by the EPA and by citizens of the United States by citizen lawsuits. All applicable requirements in the AOP, including Standard Terms and Conditions, Generally Applicable Requirements, and Specifically Applicable Requirements are federally enforceable unless identified in the AOP as enforceable only by the state and labeled as “state only”.

Chapter 173-401 WAC is not federally enforceable although the requirements of this regulation are based on federal requirements for the air operating permit program. Upon issuance of the AOP, the terms based on Chapter 173-401 WAC will become federally enforceable for Linde.

Most rules and requirements are followed by a date in parentheses. Two different versions (identified by the date) of the same regulatory citation may apply to the source if federal approval/delegation lags behind changes made to the Washington Administrative Code (WAC) or the NWCAA Regulation. The date associated with a WAC regulation denotes the “State Effective Date” of the regulation. For SIP-approved WAC regulations (identified by the absence of the “state only” designation), the date represents the “State Effective Date” of the regulation version that was SIP-approved. For NWCAA regulations, the date represents the most recent NWCAA Board of Directors adoption date, which is identified as the “Passed” or “Amended” date in the NWCAA Regulation. For SIP-approved portions of the NWCAA Regulation (also identified by the absence of the “state only” designation), the parenthetical date represents the “Passed” or “Amended” date of the Regulation version that was SIP-approved. The date associated with an OAC permit represents the latest revision date of that OAC. For a federal rule, the date is the rule’s most recent promulgation date.

### **3.4 Future Requirements**

There are no pending applicable requirements that apply to Linde. Some requirements that are not applicable until triggered by an action, such as the requirement to file an application prior to constructing a new source, are addressed within Section 3 of the AOP. There is presently no pending application to construct a new emission source at Linde. Linde officials have certified in their permit application that the facility will meet any future applicable requirements on a timely basis.

### **3.5 Compliance Options**

Linde did not request emissions trading provisions or specify more than one operating scenario in the operating permit application, so the permit does not address these options. This operating permit does not condense overlapping applicable requirements (streamlining) nor does it provide any alternative emission limitations.

## **4 PERMIT ELEMENTS AND BASIS FOR TERMS AND CONDITIONS**

### **4.1 Permit Elements**

The Linde AOP is divided into the following sections:

Permit Information Page

Attest

Table of Contents

Section 1- Emissions Unit Identification

Section 2 - Standard Terms and Conditions

Section 3 – Standard Terms and Conditions for NSPS and NESHAP

Section 4 - Generally Applicable Requirements

Section 5 – Specifically Applicable Requirements

Section 6 - Inapplicable Requirements

### **4.2 Permit Information**

The Permit Information page identifies the source and provides general information relevant to the permit such as the facility address, the responsible corporate official, the permit issuance date and the permit expiration date, and the agency personnel responsible for permit preparation, review, and issuance.

### **4.3 Attest**

The Attest page provides authorization for the source to operate under the terms and conditions contained in the permit.

### **4.4 Section 1 Emission Unit Identification**

The Emission Unit Identification section lists emission units, rated capacities, installation date, and air pollution control methods at the Linde facility.

### **4.5 Section 2 Standard Terms and Conditions**

The Standard Terms and Conditions section of the AOP (Section 2) specifies administrative requirements or prohibitions with no ongoing compliance monitoring requirements. The legal authority for the Standard Terms and Conditions is provided in the citations in Section 2 of the AOP. The description of the regulation in each of these conditions (with the exception of those labeled “Directly enforceable under WAC 173-401-615(1)(b) & (c), 10/17/02”) is sometimes a paraphrase of the actual regulatory requirement. Where there is a difference between the actual requirement and the paraphrased description, the cited regulatory requirement takes precedence. In an effort to make the section more readable, the terms and conditions have been grouped by function. In some cases, similar requirements at the state and local authority level have been grouped together.

Several permit conditions in Section 2 of the AOP are labeled “Directly enforceable under WAC 173-401-615(1)(b) & (c), 10/17/02”. These conditions are a clarification of the regulatory requirements, as the NWCAA interprets those requirements. “Directly enforceable” conditions are legal requirements with which the permittee must comply and are directly enforceable through the permit per NWCAA’s gap-filling authority.

A number of requirements that would not be applicable until triggered have also been included in Section 2 of the AOP. An example of one such requirement is the requirement for a source to submit an application for new source review.

#### **4.6 Section 3 Standard Terms and Conditions for NSPS and NESHAP**

Linde is subject to the standards of performance for petroleum refineries (Subpart Ja to Part 60 of 40 CFR) and also to the boiler MACT (Subpart DDDDD to Part 63 of 40 CFR). Section 3 of the AOP includes the standard terms and conditions that are contained in Subpart A (General Provisions) of 40 CFR 60 and Subpart A of 40 CFR 63. Such standard terms and conditions are administrative, notification, and/or other requirements that typically have no ongoing compliance monitoring requirements.

#### **4.7 Section 4 Generally Applicable Requirements**

The Generally Applicable Requirements section of the permit identifies requirements that apply broadly to Linde. With some exceptions, each of these requirements applies non-specifically to sources. For example, NWCAA Regulation Section 455.1 broadly prohibits particulate emissions that exceed 0.1 gr/dscf from any emissions unit. However, some requirements apply to only certain types of emissions units. For example, NWCAA Regulation Section 455.11 applies only to combustion equipment and WAC 173-400-060 applies only to general process units. Despite these differences in applicability, these requirements have been listed together in the Generally Applicable Requirements section of the permit.

The Generally Applicable Requirements are organized in Table 4-1 in the permit. The first column of Table 4-1 provides permit term numbers used to identify listed elements. The requirements specified in the second column are applicable plant-wide to all emission units at the source, including insignificant emission units. The third column describes the applicable requirements for informational purposes only, and is not enforceable. The fourth column identifies monitoring the permittee must perform to ensure compliance with the applicable requirement as required by WAC 173-401-605(1) and 615(1) and (2). The fourth column is enforceable except that insignificant emission units are exempt from all monitoring, recordkeeping and reporting requirements.

Chapter 173-401 WAC requires the permit to include both a reference test method and a monitoring method. The Monitoring Recordkeeping and Reporting (MR&R) requirements in the fourth column indicate official methods that the NWCAA, the EPA, or the WDOE may use to determine compliance with applicable requirements. Where the applicable requirement fails to specifically state a test method, a method is added to the permit, as required by WAC 173-401-615(1)(a). The facility has no immediate obligation to perform these tests. If the NWCAA determines via the stated reference test method or other methods that the facility is not complying with the associated applicable requirement, then a violation of the applicable requirement has occurred.

#### **4.8 Specifically Applicable Requirements**

This section lists applicable requirements that apply uniquely to a process unit or to a specific category of process unit. Typically, these requirements originate from an Order of Approval to Construct issued by NWCAA. Gap filling, which is described more fully in Section 4.9, was necessary in some cases to fulfill the requirements of Chapter 173-401-615 WAC.

#### **4.9 Gap Filling**

Some regulations or statutes do not specify compliance determination or monitoring methods. Chapter 173-401-615 WAC requires the AOP to feature monitoring, recordkeeping and reporting adequate to demonstrate compliance with applicable requirements. In these cases, a site-specific compliance monitoring method was developed based on the characteristics of the permitted facility, the nature of the underlying requirement, the requirements of Chapter 173-401-615 WAC, and EPA guidance. The process of developing and implementing these requirements is called “gap filling”. The following describes the derivation of site specific compliance monitoring in the Linde AOP.

As an example of gap-filling, consider permit term 4.1 that references WAC 173-401-615(3) (10/17/02). The WAC rule states that submittal of reports must be at least once every six months. In order to make the requirement less ambiguous permit term 4.1 was gap-filled to require reports to cover regular intervals and be submitted over specified date windows.

As another example of gap-filling, consider permit terms 4.3-4.12. These permit terms have to do with general nuisance, odor, and fugitive dust emissions, referencing applicable sections of WAC 173-400 and the NWCAA Regulation. For example, WAC 173-400-040(4), which describes fugitive dust emissions, states that the source “shall take reasonable precautions to prevent the release of air contaminants from the operation.” Therefore, in order to streamline MR&R requirements, where they exist, and introduce MR&R requirements, where they were absent altogether, gap-filling was employed. In this case, a written air contaminant complaint response plan must be developed and maintained at the site, and a procedure for dealing with complaints is outlined.

#### **4.10 Section 6 Inapplicable Requirements**

Washington Administrative Code 173-401-640(2) allows a determination regarding the applicability of requirements with which the source must comply. Section 6 of the permit lists requirements deemed inapplicable based on the applicability of the cited regulation. It is stated in the AOP that the permit shield applies to the specific, listed inapplicable requirements.

## 5 INSIGNIFICANT EMISSION UNITS AND INAPPLICABLE REQUIREMENTS

### 5.1 Insignificant Emission Units

Washington Administrative Code 173-401-640 allows a determination regarding the applicability of requirements with which the source must comply. Section 6 of the permit lists requirements deemed inapplicable based on the applicability of the cited regulation.

Categorically exempt insignificant emissions units listed in WAC 173-401-532 are present at the Linde facilities. These categorically exempt emissions units normally have extremely low emissions and are considered insignificant by regulation and not of sufficient importance to list in the permit. Other emission units or activities generate only fugitive emissions for which there are no specifically applicable requirements. These activities are categorized as insignificant by Chapter 173-401-530(1)(d) WAC. Categorically insignificant and fugitive emission units and activities are listed in the following table.

**Table 5-1 Insignificant Activities/Emission Units**

Unit/Activity	WAC Citation Category
Internal combustion engines for propelling or powering a vehicle	WAC 173-401-532(10)
Cleaning and sweeping of streets and paved surfaces	WAC 173-401-532(35)
Fuel and exhaust emissions from vehicles in parking lots	WAC 173-401-532(54)
Steam vents and safety relief valves not emitting process chemicals	WAC 173-401-532(87)
Air compressors, pneumatically operated systems, and related hand tools	WAC 173-401-532(88)

### 5.2 Inapplicable Requirements

Chapter 173-401-640 WAC requires the permitting authority to issue a determination regarding the applicability of requirements with which the source must comply. Table 6 in the permit lists requirements deemed inapplicable to the emission units identified in Table 1-1 in the AOP and provides the basis for each determination.

## 6 PUBLIC DOCKET AND DEFINITIONS

### 6.1 Public Docket

Copies of this permit as well as the permit application and any technical support documents are available online at [www.nwcleanair.org](http://www.nwcleanair.org) and at the following location:

Northwest Clean Air Agency  
1600 South Second Street  
Mount Vernon, WA 98273-5202

### 6.2 Definitions and Acronyms

"Acid Rain Program" means the program aimed at the reduction of SO<sub>2</sub> and NO<sub>x</sub> emissions, thereby reducing the deposition of acid rain.

An "area source" means any stationary source of hazardous air pollutants that is not a major source.

"Attainment area" means a geographic area designated by EPA as having attained the National Ambient Air Quality Standard for a given criteria pollutant.

"BACT" (Best Available Control Technology) is an emissions limitation which is based on the maximum degree of control that can be achieved. It is a case-by-case decision that considers energy, environmental, and economic impact. BACT can be add-on control equipment or modification of the production processes or methods.

An "emission unit" is any part or activity of a stationary source that emits or has the potential to emit any regulated air pollutant.

"Fugitive dust" means a particulate emission made airborne by forces of wind, man's activity, or both. Unpaved roads, construction sites, and tilled land are examples of areas that originate fugitive dust.

"Fugitive emissions" means emissions that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

"General permit" means a permit which covers multiple similar sources or emissions units in lieu of individual permits being issued to each source.

"GHG (Greenhouse gases)" are gases that trap infrared heat in the atmosphere. According to EPA definition, GHG means carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), sulfur hexafluoride (SF<sub>6</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases as defined in 40 CFR 98.

"HAP (Hazardous Air Pollutants)" are substances that are named as hazardous by the Clean Air Act. These substances, such as benzene, formaldehyde, or chromium-6, present tangible, serious hazards to humans.

"MACT (Maximum Achievable Control Technology)" is control technology requirement for major sources of HAP.

A "major source" means any stationary source that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants, or 100 tons per year of any other regulated pollutant.

"NAAQS (National Ambient Air Quality Standards)" are ambient concentration standards set by EPA for pollutants considered harmful to public health and the environment. Currently there are NAAQS for six so-called "criteria pollutants": carbon monoxide (CO), lead (Pb),

nitrogen dioxide (NO<sub>2</sub>), ground-level ozone (O<sub>3</sub>), particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and sulfur dioxide (SO<sub>2</sub>).

An "NOV (Notice of Violation)" is issued by an environmental regulatory agency to initiate enforcement action.

The "New Source Review (NSR)" is a pre-construction permitting program. It ensures that air quality is not significantly degraded from the addition of new or modified facilities, but also ensures that any large new or modified industrial sources will be as clean as possible. NSR permits are legal documents that the facility owners/operators must abide by. The permit specifies what construction is allowed, what emission limits must be met, and often how the emissions source must be operated.

"Opacity" means the degree to which an object seen through a plume is obscured, stated as a percentage. 100% opacity means nothing is seen through the plume, and 0% opacity means everything is visible (no plume at all).

"PTE (Potential to emit)" means the maximum capacity of a source to emit a pollutant under its physical and operational design. It usually means the emissions from a round-the-clock operation (24 hrs/day x 365 days = 8760 hours in a year). Any physical or operational limitation on the capacity of the source to emit a pollutant is treated as part of its design only if the limitation or the effect it would have on emissions is enforceable.

"PSD (Prevention of Significant Deterioration)" is an EPA program in which state and/or federal permits are required in order to restrict emissions from new or modified sources in places where air quality already meets or is better than NAAQS.

"(RACT) Reasonably available control technology" means the lowest emission limit that a particular source or source category is capable of meeting by the application of control technology. This technology must be reasonably available considering technological and economic feasibility. RACT is determined on a case-by-case basis, taking into account the impact of the source upon air quality, the availability of additional controls, the emission reduction to be achieved by additional controls, the impact of additional controls on air quality, and the capital and operating costs of the additional controls. RACT requirements for any source or source category are adopted only after notice and opportunity for comment are afforded.

"Synthetic Minor permits" impose federally enforceable limits to restrict a facility's potential emissions to below major source thresholds. This option makes it possible for those facilities that can comply with the Synthetic Minor permit's federally enforceable limits to operate without the need for a Title V permit.

The following is a list of Acronyms used in the Air Operating Permit and/or Statement of Basis:

AIRS	Aerometric Information Retrieval System
AMP	Alternative Monitoring Plan
AOP	Air Operating Permit
ASIL	Acceptable Source Impact Level
ASTM	American Society for Testing and Materials
BACT	Best available control technology
BFO	Ecology Bellingham Field Office
BTU	British Thermal Unit

CAAA	Clean Air Act Amendments
CAM	Compliance Assurance Monitoring
CD	Consent Decree
CEM	Continuous Emissions Monitor
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CH <sub>4</sub>	Methane
CO <sub>2</sub>	Carbon dioxide
CO	Carbon monoxide
COMS	Continuous Opacity Monitoring System
dscf	dry standard cubic feet
EPA	The United States Environmental Protection Agency
FCAA	Federal Clean Air Act
FCCU	Fluid catalytic cracking unit
FGS	Flue gas scrubber
gr	grain, a unit of mass (there are 7,000 grains in a lb)
GHG	Greenhouse Gases
H <sub>2</sub> S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HC	Hydrocarbons
HRSG	Heat Recovery Steam Generator
ISO	International Organization for Standardization
LDAR	Leak Detection and Repair
MACT	Maximum Achievable Control Technology
MMBtu	Million British thermal units
MR&R	Monitoring, recordkeeping, and reporting requirements
NAAQS	National Ambient Air Quality Standards
NH <sub>3</sub>	Ammonia
NOC	Notice of Construction
NO <sub>x</sub>	Oxides of Nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
NWCAA	Northwest Clean Air Agency
O <sub>2</sub>	Oxygen
O <sub>3</sub>	Ozone

OAC	Order of Approval to Construct
PM	Particulate Matter
PM <sub>10</sub>	Particulate Matter less than 10 micrometers in diameter
PM <sub>2.5</sub>	Particulate Matter less than 2.5 micrometers in diameter
ppb	parts per billion
ppmvd	parts of pollutant per million parts of dry stack gas on a volumetric basis
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
PTE	Potential to emit
QA/QC	quality assurance/quality control
RACT	Reasonably Available Control Technology
RATA	Relative Accuracy Test Audit
RCW	Revised Code of Washington
SCR	Selective Catalytic Reduction
scf	standard cubic foot (cubic foot of gas at ISO STP)
SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SRU	Sulfur recovery unit
STP	Standard Temperature and Pressure
TAP	Toxic Air Pollutant
TSP	Total Suspended Particulates
ULSD	Ultra low sulfur diesel (less than 15 ppm sulfur content)
VOC	Volatile Organic Compounds
WAC	Washington Administration Code
WDOE	Washington State Department of Ecology



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- F. The SMR heater burners are equipped with ultra-low nitrogen oxide (NO<sub>x</sub>) technology (ULNB) with a performance rating of 0.04 lb NO<sub>x</sub> per MMBTU.
- G. The SMR heater was source tested initially for compliance with OAC 1104 and 40 CFR Part 60 Subpart Ja on July 12, 2013, including stack NO<sub>x</sub> and corresponding oxygen (O<sub>2</sub>) levels to be used as NO<sub>x</sub> surrogate.
- H. Linde operated the SMR heater within the established O<sub>2</sub> range in accordance with 40 CFR 60.104a(l)(6) using the SMR heater combustion control oxygen monitoring system.
- I. On January 28, 2014, Linde notified NWCAA by letter that the SMR heater combustion control oxygen monitor does not meet the quality control requirements of 40 CFR Part 60 Subpart Ja (specifically the quarterly audit and daily calibration drift assessments).
- J. In the January 28, 2014 letter, Linde stated that the SMR heater combustion control oxygen monitor is being maintained in accordance with the manufacturer's recommendations, including monthly calibrations and that the oxygen data collected demonstrates that the SMR heater is operating in compliance with the applicable NO<sub>x</sub> standards.
- K. EPA determinations of applicability<sup>1</sup> have applied 40 CFR Part 60 Subparts J and Ja to aggregated petroleum refinery stationary sources, including SMR process heaters.
- L. One EPA determination of applicability involving an aggregated petroleum refinery stationary source was overturned by the United States Court of Appeals for the Third Circuit.<sup>2</sup>

**III.**

**Regulatory Basis**

- A. 40 CFR Part 60, Subpart Ja applies to "affected facilities" that commence construction, modification or reconstruction after May 14, 2007. Fuel gas combustion devices, including process heaters, are affected facilities subject to Subpart Ja.
- B. Subpart Ja requires an owner or operator of an affected process heater to comply with specified NO<sub>x</sub> emission limits and to install and operate a continuous emissions monitoring system to ensure compliance. 40 CFR 60.102a(g)(2), 60.107a.
- C. The effective date of the NO<sub>x</sub> emission limits for process heaters in Subpart Ja was stayed by EPA pending reconsideration of several provisions [73 Fed. Reg. 55751

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<sup>1</sup> See Applicability Determination Index (ADI) control numbers 0800090 (November 20, 2008), and 1000045 (September 15, 2010).

<sup>2</sup> *Star Enterprise v. EPA*, 235 F.3d 139 (3rd Cir. 2001).

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(Sept. 26, 2008)]. On September 12, 2012 EPA published the final Subpart Ja rule on reconsideration, and lifted the stay on the effective date of the NO<sub>x</sub> emission limits for process heaters [77 Fed. Reg. 56422 (Sept. 12, 2012)]. The effective date of the NO<sub>x</sub> emission limits for process heaters was November 13, 2012.

- D. The definition of "fuel gas" is the same under 40 CFR 60.101(d) (Subpart J) and 40 CFR 60.101a (Subpart Ja): "Fuel gas means any gas which is generated at a petroleum refinery and which is combusted. Fuel gas includes natural gas when the natural gas is combined and combusted in any proportion with a gas generated at a refinery...".
- E. 40 CFR 60.102a (g)(2)(ii) (applicable emission limits) provides: "For each forced draft process heater, comply with the limit in either paragraph (g)(2)(ii)(A) or (B) of this section. The owner or operator may comply with either limit at any time, provided that the appropriate parameters for each alternative are monitored as specified in §60.107a; if fuel gas composition is not monitored as specified in §60.107a(d), the owner or operator must comply with the concentration limits in paragraph (g)(2)(ii)(A) of this section. (A) 60 ppmv (dry basis, corrected to 0-percent excess air) determined daily on a 30-day rolling average basis; or (B) 0.060 lb/MMBtu higher heating value basis determined daily on a 30-day rolling average basis."
- F. 40 CFR 60.107a (c)(5) (applicable monitoring requirements) provides: "The owner or operator shall comply with the quality assurance requirements in Procedure 1 of Appendix F to part 60 for each NO<sub>x</sub> and O<sub>2</sub> monitor, including quarterly accuracy determinations for NO<sub>x</sub> monitors, annual accuracy determinations for O<sub>2</sub> monitors, and daily calibration drift tests."

#### IV.

##### Determinations

Based upon the foregoing Findings of Fact and Regulatory Basis, NWCAA makes the following Determinations:

- A. Linde is a "support facility" to the Shell Puget Sound Refinery because all the hydrogen gas produced at the plant is provided to Shell's petroleum refining process.
- B. Linde is part of the refinery "stationary source" and as such, is subject to the Title V program.
- C. Consistent with recent EPA determinations of applicability, the SMR heater furnace is an affected facility subject to 40 CFR Part 60 Subpart Ja for NO<sub>x</sub> emissions, and is required to comply with the 0.060 lb/MMBtu or 60 ppmv corrected to 0% O<sub>2</sub> (30-

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day rolling average) NO<sub>x</sub> emission limit and to install and operate a continuous emissions monitoring system (CEMS) to demonstrate compliance with the limit.

- D. The decision in *Star Enterprise* by the United States Court of Appeals for the Third Circuit does not affect the 40 CFR Part 60 Subpart Ja applicability determination at Linde.
- E. Linde is currently operating in violation of 40 CFR 60.107a(c)(5) quality assurance and quality control procedures applicable to the oxygen monitor as a NO<sub>x</sub> surrogate compliance demonstration. (NWCAA issued Notice of Violation 4083 on April 15, 2014.)
- F. Based on the monitoring submitted by Linde, the facility is operating in compliance with the NO<sub>x</sub> limit.
- G. This Order constitutes a final settlement. It addresses and provides resolution of the non-compliance allegations in NOV 4083.

**V.**

**Terms of Order: Actions to Be Taken**

Based on the forgoing Facts, Regulatory Basis, and Determinations, it is hereby ordered that Linde take the following actions:

- A. On or before July 22, 2014, Linde shall submit a modification application regarding the clarification of startup and shutdown and testing requirements in OAC 1104 with the required modification fees.
- B. On or before September 30, 2014, Linde shall install and certify a CEMS meeting the requirements of 40 CFR Part 60 Subpart Ja for NO<sub>x</sub> monitoring.
- C. Upon demonstration of compliance with 40 CFR Part 60 Subpart Ja monitoring requirements, Linde shall provide a written notification to NWCAA.

**VI.**

**Terms and Definitions in Order**

Unless otherwise specified, the definitions set forth in NWCAA Regulation 200, WAC 173-400 & 401, RCW 70.94, 40 CFR 60.2, and 40 CFR 60.101a shall control the meanings of the terms used in this Order.

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**VII.**

**Satisfaction of Order**

The provisions of this Order, as amended by any modifications, shall be deemed satisfied upon Linde's receipt of written notification of such satisfaction from Northwest Clean Air Agency and upon compliance with all provisions of this Order.

**VIII.**

**Enforcement**

Pursuant to RCW 70.94.430 and 431, this Order may be enforced by the Northwest Clean Air Agency.

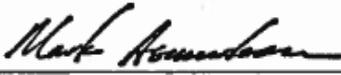
**IX.**

**Order Not Subject to Appeal**

The terms of this Order having been agreed to by both parties, it is further stipulated that the same shall be final and not be subject to appeal in accordance with RCW 43.21B.230 and NWCAA Regulation 122.

Effective date of this Order: 8/28/14

ORDERED BY:  
NORTHWEST CLEAN AIR AGENCY

By: 

Mark Asmundson,  
Executive Director

AGREED BY:  
LINDE GAS NORTH AMERICA LLC

By:  8/26/14

Terry Phipps,  
Head of HYCO SMR and ROC